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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/539,066

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EXAMINER

STONE, ROBERT M

ART UNIT

PAPER NUMBER

2629

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DELIVERY MODE

05/25/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/539,066	Applicant(s) OKISHIRO ET AL.	
	Examiner Robert M. Stone	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 7, 8 and 11-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 9 and 31-33 is/are rejected.
- 7) ☒ Claim(s) 5, 6 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 December 2009 has been entered.

Response to Amendment

2. The amendment filed on 29 December 2009 has been entered and considered by the examiner.

Claim Objections

3. Claims 1-6, 9, 10, and 31-33 are objected to because of the following informalities: Claim 1 has a minor grammatical error in line 12 which states "plurality of of light emitting tubes". Examiner suggests "plurality of light emitting tubes". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4, 9, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hirakata* (US 2002/0036608) in view of *Ohno* (US 5,825,124).

As to **claim 1**, *Hirakata* discloses a liquid crystal display (title) comprising:

a light source made of a plurality of light emitting tubes (backlight system for the LCD panel contains multiple fluorescent lighting tubes and/or cold-cathode tubes [0005 and 0226]; Fig. 31), at least one of said plurality of light emitting tubes having plural kinds of phosphors (each fluorescent lamp contains multiple phosphors [0192, 0206]), and having a turned-on state and a turned-off state within one frame (turned on and off in one period [0006, 0011 and 0148]; Fig. 11a, c, and d); and

a liquid crystal panel for adjusting the amount of light transmitted from said light source (driving circuitry of Fig. 1 is used to control the amount of light emitted from the tubes while the LCD panel itself is driven by the image data in order to twist/untwist the liquid crystal molecules to adjust the amount/color of light seen by the user [0068]);

decreasing a luminance factor area of light of the phosphors of each of the plural kinds of light emitting tubes during a luminance fall time when said light source changes from said turned-on state to said turned-off state (by adjusting the current used to drive the backlight tubes of the display, the rise and fall times of the brightness/luminance curve is manipulated decreasing the luminance factor area under the rise and fall curves by increasing the current supplied to the

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tube. As shown in Fig. 18b-e, increasing the current shrinks the period of rise and fall times of the backlight brightness. Since this backlight brightness measurement is taken as a whole, however includes multiple colored phosphors [00192], it is understood that shrinking these waveforms shrinks the rise and fall times of each phosphor making them substantially equal. Further, there is no mention of any phosphor extremes that might attribute to longer rise/fall times than those illustrated; Fig. 10, 11d, and 18b-e).

Hirakata does not expressly disclose wherein a luminance factor area of light from one phosphor of said plural kinds of phosphors of said at least one of said plurality of light emitting tubes or a change in luminance factor per time of said light of said one phosphor of said plural kinds of phosphors of said at least one of said plurality of light emitting tubes is substantially equal to that of light from any other phosphor of said plural kinds of phosphors of said at least one of said plurality of light emitting tubes in at least one of a luminance rise time when said light source changes from said turned-off state to said turned-on state and a luminance fall time when said light source changes from said turned-on state to said turned-off state.

Ohno (Figs. 1-8) discloses lighting tubes with multiple phosphors (red, green, blue phosphors [col. 2, lines 58-60]) wherein a luminance factor of area of light from one phosphor of the plural kinds of phosphors is substantially equal to that of light from any other phosphor of the plural kinds of phosphors during a luminance fall time when the light source changes from a turned-on state to a

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turned-off state (the chemical activator of green and blue phosphors is altered in order to decrease their afterglow times (luminance factor area of light during fall time) and make them substantially equal to that of red which is shorter resulting in red, green, and blue phosphors in a lighting tube all with substantially equal fall times and therefore the factor area of light during that fall time [col. 2, lines 19-22, 26-31, 58-67; col. 3, lines 31-42; col. 5, lines 33-42]).

At the time of invention, it would have been obvious for a person of ordinary skill in the art to have made the luminance factor area of light or luminance factor per time of one phosphor substantially equal to that of another phosphor as taught by *Ohno* in the backlight tubes of *Hirakata*. The suggestion/motivation would have been to prevent persistence of colors on the screen (also known as an after image, blurring, ghosting, or bleeding) and thus display images of good quality and increased resolution since humans are highly sensitive to differences in color [col. 2, lines 65-67; col. 3, lines 31-43; col. 5, lines 40-42].

As to **claim 2**, *Hirakata* discloses wherein said light source is made of light emitting tubes of one kind (fluorescent lamps [0011] of cold-cathode tubes [0021 and 0062]), and each of said light emitting tubes is a multicolor light emitting tube having at least three kinds of color phosphors (using multiple phosphors red/green/blue [0192,0206]).

As to **claim 3**, *Hirakata* discloses wherein luminance of said plural kinds of phosphors is controlled by a current value of a current applied to each of said

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light emitting tubes (adjusts the current value of the light emitting tube driving current in order to control the brightness/luminance of the display [0022]; Fig. 11c).

As to **claim 4**, *Hirakata* discloses wherein at the beginning of said luminance rise time, said current value of said current applied to said light emitting tube is a current value I_2 (at the beginning of the rise of the brightness shown in Fig. 11d, the current being supplied to the backlight lamps is I_1 [0022]; Fig. 11c) not smaller than a current value I_1 (after current value I_1 is supplied the backlight current is dropped to current I_2 [0022]) necessary for said plural kinds of phosphors to emit light with predetermined luminance in one frame (the driving current is that necessary to acquire the backlight brightness waveform as shown in Fig. 11d).

As to **claim 9**, *Hirakata* discloses wherein a current value of a current applied to each of said light emitting tubes is attenuated stepwise in said luminance fall time (backlight driving current steps down from current I_1 to current I_2 [0022]; Fig. 11c).

As to **claim 32**, *Hirakata* discloses wherein the current applied to the at least one of the plurality of light emitting tubes has a stepped shape (currents I_1 and I_2 are applied as shown in Fig. 11c which has a series of step ups from I_2 to I_1 and step downs from I_1 to I_2 [0146]).

As to **claim 33**, *Hirakata* discloses wherein the current applied to the at least one of the plurality of light emitting tubes has a pulse shape (currents I_1 and

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I2 are applied as shown in Fig. 11c which has a series of step ups from I2 to I1 and step downs from I1 to I2 which is a series of pulses known as a pulse wave/train [0146]).

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Hirakata* (US 2002/0036608) in view of *Ohno* (US 5,825,124) and *Nitta* (US 2002/0057238).

Hirakata in view of *Ohno* does not expressly disclose wherein at the turned-on state, the current applied to the at least one of the plurality of light emitting tubes has at least two values.

Nitta (Fig. 55) discloses a liquid crystal display with tube backlights wherein at the turned-on state, the current applied to the at least one of the plurality of light emitting tubes has at least two values (backlight on/off waveform has 3 different on values while during those on periods two different backlight tube currents are applied to act as "dimmers" and thereby alter luminance of the display at different periods [0183]).

At the time of invention, it would have been obvious for a person of ordinary skill in the art to have applied at least two valued currents during a turned on state as taught by *Nitta* in the backlight tube driving of *Hirakata* as modified by *Ohno*. The suggestion/motivation would have been to increase or decrease luminance for specific periods as needed [0183] thereby improving motion-frame picture blur while exhibiting excellent light-emission efficiency and uniformity at a high lamp luminance [0183,0184].

Allowable Subject Matter

7. Claims 5-6 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to newly amended independent claim 1 and claims dependent thereon have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- a. *Hirakata* (US 2002/0067332) discloses multiple types of step brightness signals for backlight tubes of a liquid crystal display.
- b. *Funamoto* (US 2003/0142118) discusses that the decay/afterglow/persistence problem of phosphors within a tube is well-known and varies lamp current to decrease the fall time.

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- c. *Tanaka* (US 6,388,649) discloses applying driving pulses to backlight tubes that are shorter than the decay/fall times of the phosphors in order to improve afterglow characteristics of the tube.
- d. *Holden* (US 5,260,625) improves the red and green phosphor fall times in a tube light by replacing them with fluorescent dyes to substantially equalize red, green, and blue fall times.
- e. *Shimomura* (US 2003/0174370) discloses an image reading apparatus which compensates for afterglow of red, green, and blue phosphors.
- f. *Kouno* (US 6,075,325) discloses manipulating the current values applied to cold cathode tubes of multiple phosphors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert M. Stone whose telephone number is (571)270-5310. The examiner can normally be reached on Monday-Friday 9 A.M. - 4:30 P.M. E.S.T. (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chanh D. Nguyen can be reached on (571)272-7772. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert M Stone/
Examiner, Art Unit 2629

/Chanh Nguyen/
Supervisory Patent Examiner, Art
Unit 2629